

Science

Science

Earth Science

Protecting Earth's Resources

Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Main Idea and Details	<ul style="list-style-type: none">• Labels• Captions• Diagrams• Glossary	Protecting Resources

Scott Foresman Science 5.10

by Carol Levine



scottforesman.com



Vocabulary

biomass
fossil fuel
geothermal
hydroelectric
nonrenewable resource
renewable resource
resource
solar energy

Illustrations: 4 Tony Randazzo

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Protecting Earth's Resources

by **Carol Levine**



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What are nonrenewable energy resources?

Types of Resources

A **resource** is a supply of energy or material that people use.

Renewable resources can be replaced. Trees are renewable because new trees can be planted after old trees are cut down.

Nonrenewable resources cannot be replaced as fast as they are used up or cannot be replaced at all.

Coal is a nonrenewable energy resource. It is formed from plants. Sometimes layers of dead plants in swamps get pressed together to form a material called peat. Over a very long time, buried peat changes to soft coal. If it is buried even longer, it can become hard coal.



Plant life



Peat



Coal



Fuel can be burned to make heat and energy. Coal is a fuel. When coal is burned, energy is released. This energy was once energy from sunlight that was stored in the swamp plants. Coal is the fuel used to run most power plants in the United States. The heat from burning coal is used to boil water. This produces steam, which can be used to spin generators. Generators make electricity.

Some other fuels form in a similar way to coal. Petroleum, or crude oil, forms from sea organisms. Natural gas forms from organisms too. Fuels that form in this way are called **fossil fuels**.



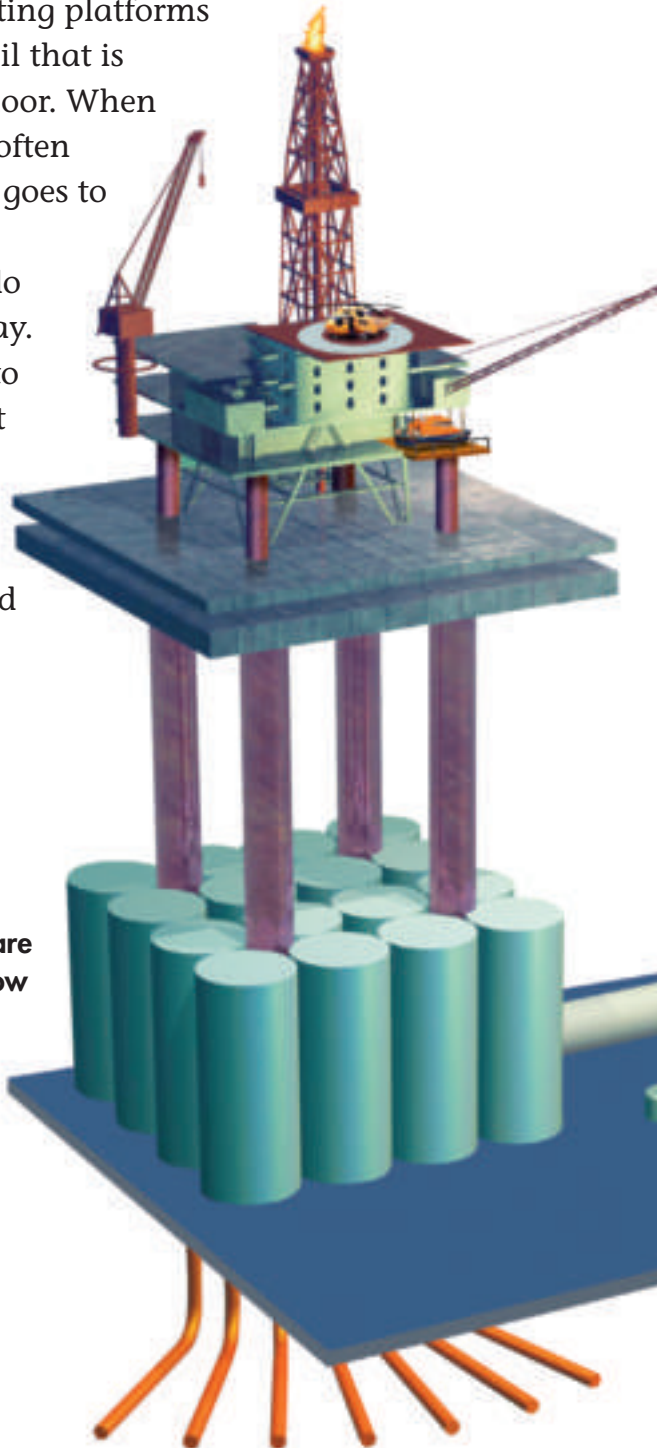


Oil and Natural Gas

Crude oil and natural gas are found below Earth's surface. Whether on land or at sea, workers use drills that make holes to reach them. Drills on floating platforms or towers are used to get oil that is located below the ocean floor. When natural gas is found, it is often carried away by a pipe. It goes to tanks to be stored.

Almost everything we do depends on oil in some way. Crude oil can be made into fuels such as gasoline that power cars and other machines. Oil and gas are also burned to make electricity. Crude oil is used to make products besides fuel. Asphalt, plastic, grease, and wax are examples.

Platforms such as this are used to drill for oil below the ocean floor.



Advantages and Disadvantages

There are several reasons why fossil fuels are so widely used. Coal and oil are easy to move and store. It is easier to get a lot of energy from coal and oil than it is from other sources. But fossil fuels have disadvantages too. Coal and oil supplies are limited. Burning coal and oil causes air pollution. Oil can spill when ships leak. Oil spills can hurt living things.

People are trying to decrease the bad effects of fossil fuels. For example, cars are being designed that use less fuel and cause less pollution.



This worker is cleaning rocks after an oil spill.



What are other energy resources?

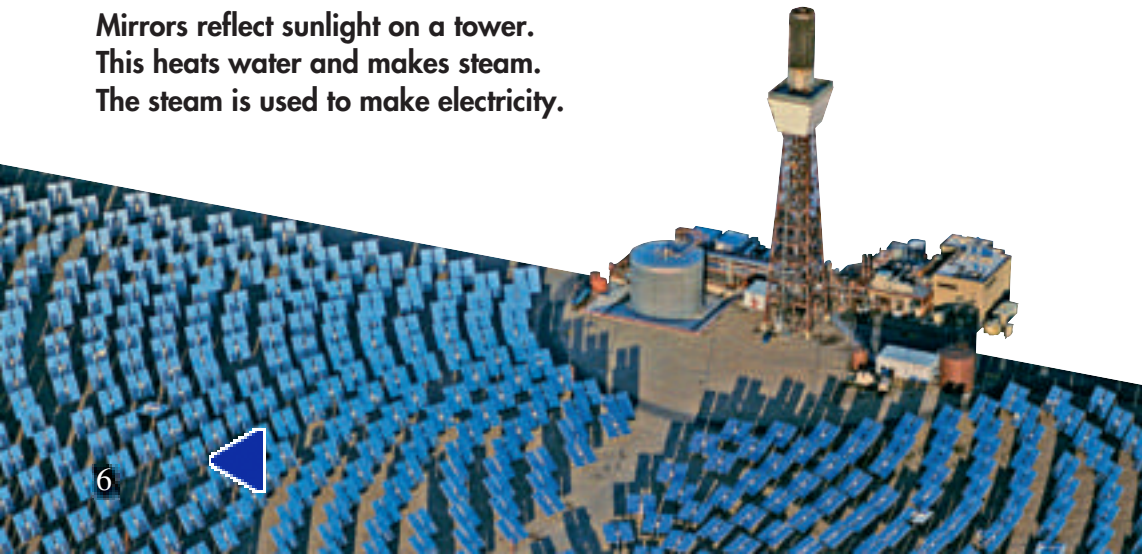
Solar Energy

Solar energy is energy from sunlight. It is a resource that will last as long as the Sun is shining. Solar cells are special devices that turn the Sun's energy into electricity. Sunlight can also be used to heat swimming pools, tap water, and greenhouses.

Advantages and Disadvantages

Sunlight will not run out for billions of years. Solar energy does not cause pollution. But sunlight cannot be used all the time. It cannot be used on cloudy days or at night. The systems that make electricity from sunlight are expensive to build and run. Also, the factories that make solar cells produce dangerous waste.

Mirrors reflect sunlight on a tower. This heats water and makes steam. The steam is used to make electricity.



Wind Energy

Wind is a renewable resource. It has been used for thousands of years. Windmills were used to pump water and grind grain. Farmers in the United States have used windmills since the 1800s to bring water up from wells. Today, modern windmills called wind turbines spin generators that make electricity.

Advantages and Disadvantages

Wind energy does not cause air pollution. But the wind is not blowing all the time. Turbines will only work when the wind is blowing. Also, some people think that the turbines are ugly and noisy.



Modern wind turbines can spin faster in light winds than old windmills did.





Moving Water

People have used the energy of moving water for a very long time. For hundreds of years, factories near rivers have used flowing water for power. Today, water is used to make electricity. **Hydroelectric** power plants are built in dams. They use water that flows through these dams to spin generators. The generators make electricity.

Advantages and Disadvantages

Water energy causes no pollution and makes no waste. It is also a renewable resource. But hydroelectric plants must be built in places that have moving water. Building a dam forms a lake. The lake floods plant and animal habitats. Also, fish can't swim past the dam.



This dam uses the power of flowing water to make electricity.



Nuclear plants give off clean steam.
They don't produce any smoke.



Nuclear Energy

Uranium is a rare metal. Nuclear power plants use uranium as a fuel to produce steam. The steam can be used to make electricity. Nuclear plants use a very small amount of fuel and they don't give off any smoke. But nuclear power plants are very expensive. They make dangerous waste. Also, uranium is a nonrenewable resource.





Geothermal Energy

The high temperature inside Earth can be used as energy. This is **geothermal** energy. If water is pumped into hot rocks deep underground, it will turn into steam. This steam comes back out of the ground at high speed. It can then be used to make electricity.

Geothermal energy can make electricity twenty-four hours a day, all year round. But geothermal power plants can only be used in places where hot rocks are not too deep in the ground. These places are rare. Also, geothermal steam may contain pollutants.

Geothermal plants use natural heat from deep below the ground.



Energy of Biomass

Biomass is material that was recently alive. It can be animal waste, wood, grasses, or food waste. Garbage is one example of biomass. This material can be burned to produce electricity, just like coal or oil. Biomass can also be made into a liquid fuel or a gas. Biomass is renewable because people will always make garbage. Biomass use reduces the amount of garbage that must be put into landfills. A disadvantage of burning biomass is that it causes air pollution.

Garbage is a renewable resource that can be used to make electricity.



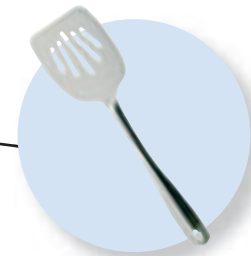


What are other resources?

Mineral Resources

Earth's resources include many things other than energy resources. Gold, iron, and copper are minerals. Minerals are nonliving materials from Earth. Some of these mineral resources are hard to find. Gold and silver are two examples. Other mineral resources, such as salt and iron, are easy to find. Many minerals are taken from underground mines.

Mineral resources have many uses. Iron is an inexpensive and useful metal. Iron can be mixed with other materials to make steel. Steel is used to make many things we use, from skyscrapers to paper clips. Some other mineral resources are gypsum, which is used to make plaster, and gravel, which is used in building roads.



Minerals are nonrenewable resources. Some minerals, such as iron, are found in large amounts. Others, such as copper, lead, and zinc, are more limited. Conservation and recycling are ways to protect these more limited resources. But they will not last forever.

Mining for mineral resources can damage the environment. It can cause air and water pollution. It affects habitats of living things. Some types of mining cause large open pits in the land, mudslides, and soil erosion. Efforts are being made to limit and repair mining damage.

Some Uses of Iron Ore





Water, Soil, and Air

Water, soil, and air are important resources that meet important needs. They are partly renewable. Water is recycled through the water cycle. Clean air is a resource that is renewed over time. Air pollution slowly settles out of the air or gets caught in rain. New soil is also made slowly. Soil is made as rock weathers and plants decay. Since these resources take a long time to be renewed, we must use them carefully.

Clean water, soil, and air are important for farmers and for all people.



Air

Air is a very important resource. Without the oxygen in air, no one could breathe! The nitrogen in the air is another important resource. It is used to make plant fertilizer, which is used to grow food.

Air can become polluted. Natural events, such as volcanoes and some forest fires, can pollute the air. Humans pollute the air with factories, cars, power plants, and mining. Air pollution can cause health problems.

Cars produce harmful pollution.





Dumping chemicals pollutes the soil.



Soil

Without the minerals and nutrients in soil, plants could not grow. We need to use these plants for food. Animals need to eat plants too. We also need soil to grow trees, which provide paper and wood.

Chemicals can pollute soil. Too many crops planted in one place can hurt it too. Soil can also erode away.



Oil spills pollute the ocean.



Water

Humans have many uses for water. We bathe in it, cook with it, and clean with it. Everything people drink has water in it. Water is also used to grow food and make electricity. Many factories depend on water to run.

Water can be polluted and overused. People pollute water by dumping waste in it. Air pollution can get into rain and form dangerous chemicals. The polluted rainwater can then harm living things and buildings.





Can resources be conserved?

Repairing Soil, Water, and Air

Since the Industrial Revolution in the 1700s, machines have been widely used to do work. Making things has become easier and transportation has improved. But machines have also caused air, water, and soil pollution. Pollution has damaged the environment. In some places, pollution is so bad that entire towns have been left empty. Removal of pollution has cost the United States billions of dollars.

Pollution levels must be watched. If they are not, pollution in the soil, air, and water may reach dangerous levels. Pollution can be measured using many different technologies. Then people can find the sources of pollution and keep it at lower levels.

Repairing damage done by pollution can be very expensive.





Conservation Laws

Many laws help protect natural resources. There are laws requiring lumber companies to replant trees in areas where they have been cut down. Mining companies must repair land damaged by mining. By law, industries must clean up any land they have polluted. These efforts are expensive but they make the environment healthier. Laws have also been used to set aside land as national parks.

Replanting trees can help ecosystems.



Using Less and Reusing Resources

All of us can help the environment by using fewer resources. We save energy by using furnaces and air conditioners less. We can also turn off lights that are not being used. Using less electricity saves fuel at power plants. Burning less fuel makes less air pollution. Large companies can use less material to make things. For example, if a water bottle is made out of thinner plastic, it saves resources.

Reusing things is an easy way to save resources. You can write on both sides of a piece of paper instead of just the front. You can also reuse bottles or other containers.

Some businesses are based on reusing things. There are companies that take apart computers and reuse the parts. Other companies reuse old tires to make playground surfaces.



Aluminum cans are now made using less metal than they once were.





Recycling

Recycling is another way to save resources. Recycling means treating materials so they can be used again.

Paper is often recycled. First it is soaked and made into a soft, wet pulp. Then it is pushed through screens to remove any objects that might be mixed into it. Next the ink is removed from the paper. The pulp is then dried and pressed into new paper. Plastic can also be recycled, as shown in the pictures.

Some materials are recycled to save energy. There is a lot of aluminum buried in Earth's crust, but mining it takes a lot of energy. Recycling it is more efficient.

It is important to save resources and energy. You can help. You can protect the environment by reducing, reusing, and recycling. These efforts do more than help the environment. They help communities.



- 1** Collecting plastic is the first step in its recycling.



- 2** At a recycling center, the containers are sorted by what type of plastic they are.



- 3** Containers are carried on a conveyor belt to a machine that will chop them into flakes.



- 4** The flakes are now ready to be washed and dried.



- 5** The flakes are dried by tumbling them in air.




- 6** The plastic flakes are melted and formed into new products, such as this slide.



Glossary

biomass	material that was recently alive
fossil fuel	fuel made from the remains of organisms that lived long ago
geothermal	energy produced by the heat inside Earth
hydroelectric	producing electricity by using the power of moving water
nonrenewable resource	a resource that cannot be replaced as fast as it is used, or cannot be replaced at all
renewable resource	a resource that can be replaced in a reasonable amount of time
resource	a supply that will meet a need for material or energy
solar energy	energy from sunlight

What did you learn?

1. Name some renewable and nonrenewable energy resources.
2. Name an advantage and a disadvantage of fossil fuels.
3. How can hydroelectric dams harm plants and animals?
4. **Writing in Science** Mining changes the land. On your own paper, write to describe some of the negative changes mining can cause. Use examples from the book in your answer.
5.  **Main Idea and Details** List the main idea and details of the first paragraph on page 21.

